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PAPER

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1 RECORD OF ORAL HEARING

2 UNITED STATES PATENT AND TRADEMARK OFFICE

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6 BEFORE THE BOARD OF PATENT APPEALS
7 AND INTERFERENCES

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10 *Ex parte* CHESTER LEDLIE SANDBERG, HAROLD J. VINEGAR,
11 CHRISTOPHER KELVIN HARRIS, JAIME SANTOR SON,
12 and FREDERICK GORDON CARL, JR.

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15 Appeal 2010-001040
16 Application 10/693,700
17 Technology Center 3700

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20 Oral Hearing Held: Thursday, November 17, 2011

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23 Before LINDA E. HORNER, JOHN C. KERINS, and
24 STEVEN D. A. MCCARTHY, *Administrative Patent Judges*.

25
26 ON BEHALF OF THE APPELLANT:

27
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33
34 The above-entitled matter came on for hearing on Thursday,
35 November 17, 2011, commencing at 3:08 p.m., at the U.S. Patent and
36 Trademark Office, 600 Dulany Street, 9th Floor, Alexandria, Virginia,
37 before Jon Hundley, Notary Public.

P R O C E E D I N G S

THE USHER: Calendar No. 74, Appeal No. 2010-001040. Mr. Meyertons.

JUDGE HORNER: Thank you.

MR. MEYERTONS: Good afternoon.

JUDGE HORNER: Good afternoon. If you have a business card --

MR. MEYERTONS: I do.

JUDGE HORNER: Could you provide it to the Court Reporter?

MR. MEYERTONS: Sure.

JUDGE HORNER: Thank you. We've had an opportunity to review your case.

MR. MEYERTONS: I can't say I'm unprepared now.

(Laughter.)

JUDGE HORNER: You have 20 minutes. You can proceed when you're ready.

MR. MEYERTONS: Okay. One of the big problems in the hydrocarbon production industry is you have these difficult-to-produce hydrocarbons, oil shale, tar sands, things of this nature.

One of the reasons it's difficult to produce is it's thick and viscous. I sound like Sylvester Stallone -- Sylvester the cat.

Anyway, you can't get it out of the formation. The solution is to heat it. The problem is you need lots and lots of heat, and you have these long distances that you have to heat, and it's a really difficult technical problem to actually heat it to the point where you can mobilize it.

1 Heating it to just a few degrees is not going to mobilize it. You'd have
2 to heat it significantly over significant periods of time in order to get
3 production on a commercial scale.

4 So, you have this problem. You've got these
5 heaters. What they do is they put these long heaters, and the problem is that
6 the formations are discontinuous, and it's not homogenous throughout.

7 What you end up having, and this is an unforeseen problem, you get
8 these hot spots. Some portions of the formation will basically -- especially
9 the richer ones, the ones with the more hydrocarbons in them, what will
10 happen is you will start heating it.

11 You have this long heater. Typically, let's say it's an electric
12 resistance heater, like we have in these claims. You've got this long electric
13 resistance heater. You're heating this formation. Some places get hotter,
14 and sometimes what will happen in some formations is they will actually
15 expand and crush the heater. Therefore, you have lost millions of dollars on
16 your well.

17 So, it's a big problem. It wasn't discovered until our client, Shell,
18 discovered it, when they did a pilot in oil shale and this happened to them.
19 They said, "oh, my gosh, you know, this has never happened before, we
20 didn't anticipate this. What do we do?"

21 They tried lots of solutions. You know, you can try to log the well.
22 You can try to put thicker pieces of pipe in there. The problem with all that
23 is they are inefficient, and you don't really know exactly where you are
24 going to get your spots, where you are going to get this crushing.

25 What they developed, and it took them years to develop this, but they
26 had a technique where they decided they were going to make those heaters

1 out of a Curie material, a temperature limited heater, so that -- what happens
2 is you are supplying current and the current is constant, but the electrical
3 resistance in a Curie heater, what happens is if a temperature gets too high,
4 the resistance will suddenly just drop off, and that's great.

5 That is a wonderful feature for these heaters, and it's a wonderful
6 invention because when you get these hot spots and it gets too hot, it
7 automatically -- basically the temperature gets high enough, the electrical
8 resistance goes to zero, so in that section, it stops heating.

9 JUDGE McCARTHY: So, the resistance can go to zero locally?

10 MR. MEYERTONS: Locally, yes. That's a really, really big deal
11 because let's say you're heating 1,000 feet of formation. Well, you know,
12 heating is the name of the game. You're trying to cram as much heat as you
13 can in this formation. If you get one ten foot hot spot -- in the previous
14 systems, if you got a ten foot hot spot, it crushed your well, you're done.
15 Everything is broken. You have to drill a new well. You can't even get the
16 stuff out of the well. If you try pulling it, it just breaks.

17 With this system, if you get ten foot of hot spot, it will get to the point
18 where it gets hot, the electrical resistance goes to zero, it stops heating.
19 Exactly what you want where you want the heat to stop presenting itself to
20 the formation.

21 It's a really, really big deal. It makes a huge difference in your ability
22 to -- if you're going to spend billions of dollars to put a bunch of heater wells
23 in a formation, you don't want them all breaking about a year and a half into
24 it, after you have invested all this money and electricity to get them to the
25 point where they're hot.

1 So, by putting these in, you can have assurance you're not going to
2 have this severe problem.

3 What happened was we filed this application. We have in our claims
4 several features. Take independent claim 1691. It starts out it is a system
5 configured to heat a hydrocarbon containing formation. I know that's
6 preamble, but that system is referenced later in the claim, so that's brought
7 into the claim.

8 So, we're talking about something to heat hydrocarbon containing
9 formation, and that's important because the prior art doesn't do that. The
10 main reference, Eastlund, specifically, does not do that.

11 So, you have a heater wall that extends from the surface through the
12 overburden into the formation. You have to have an AC supply. This only
13 works, by the way, with AC. You can't use it with DC, because the Curie
14 effect doesn't work unless you have AC current.

15 Then you have electrical conductors in the claims which extend again
16 into the surface of the hydrocarbon containing formation. Of course, they're
17 connected up to the AC supply.

18 Then the electrical conductors have electrically resistant
19 ferromagnetic material, and that material again has this temperature
20 application, so when it gets to a selected temperature, it basically will drop
21 off and stop heating.

22 The whole system is configured so that it provides heat to the
23 hydrocarbon containing formation so that you transfer heat to the
24 hydrocarbons and you mobilize the hydrocarbons.

25 This is a short way of me sort of paraphrasing what is in the claim.

1 The reason all those things are important is to solve this problem of
2 the crushing. What the Examiner did is he took Eastlund, and he basically
3 combined it with three other references. Of those three references, the Rose
4 reference, I think, is the most important.

5 The Eastlund reference is the primary reference. He takes Eastlund.
6 In Eastlund, there is a separate problem in the oil industry. I used to be an
7 engineer, by the way, in the oil industry. You have this problem where
8 when you're producing stuff and maybe it's coming out slow, but when it's at
9 the lower levels and you're producing it, no problem, it's hot. Everybody
10 knows the deeper you go in the earth, the hotter it gets.

11 So, when you're producing this stuff from hundreds of feet below the
12 surface, it's hot, no problem. As it comes to the surface, especially if it's
13 flowing fairly slowly, it will cool. You will form hydrates. The hydrates
14 will form solids. Boom, your well is plugged.

15 So, Eastlund developed a system to address this problem. The
16 Eastlund system talks about heating from like 73 degrees to 85 degrees F.
17 Very low amounts of heating.

18 What is he trying to do? Just a little bit of heating to stop the hydrates
19 from forming. He's not doing it in the lower sections of the formation
20 because they're already hot. There's no reason to do it there. There is no
21 reason to heat something which is already 200 degrees and it's not forming
22 hydrates.

23 What he does, and in all of his drawings, and this is one of the issues
24 that we went back and forth on with the Examiner, he has these heaters that
25 go through down the tubing, it goes down in the upper portions of the

1 formation, and basically he's just got an electric resistance heater at the very
2 top.

3 JUDGE McCARTHY: The heater in Eastlund does go into the
4 formation?

5 MR. MEYERTONS: It does not go into the hydrocarbon formation.
6 It goes into the ground. Did I say "formation?" It goes into the ground. It
7 does not go into the hydrocarbon producing area of the formation.

8 If you look at his figures, his figures demonstrate that. In all the
9 Eastlund figures, he has these what we call "zigzag broken lines," and if you
10 take, for example, Figure 1. In Eastlund, Figure 1, he's got these zigzag lines
11 right here that separate -- this is the electrically heated portion. This is the
12 portion his patent was directed to, that's why the majority of his drawing is
13 directed to that.

14 He has these zigzag lines. Those zigzag lines indicate distantly or
15 remotely related. That's well known and established.

16 The reason why is the perforations down here, 12 are the perforations,
17 that's where the formation is. The oil comes in, the gas comes in. It goes a
18 long distance and then it gets to the upper portions of the formation. When
19 it gets there, it starts to cool off, and that's where he puts his heating.

20 The Examiner says well, actually Eastlund shows a heater going all
21 the way into the formation. That's not true. It's not a heater well. One of the
22 key limitations -- in fact, really, when you look at Eastlund -- I think it's kind
23 of interesting about Eastlund, it's the primary reference cited, and if I go
24 through each of the features, which I'm going to do in a second of Claim
25 1691, the independent claim, all the features are not shown in Eastlund, with
26 the exception of an AC supply.

1 Specifically, the preamble says "[a] system configured to heat a
2 hydrocarbon contained formation." Eastlund doesn't do that. It just simply
3 doesn't. It heats the tubing at the top of a well, not the hydrocarbon
4 containing formation.

5 "[A] heater well extending from the surface of the earth through an
6 overburden of the formation into a hydrocarbon containing layer in the
7 formation. Eastlund doesn't do that.

8 Yes, he has a well. All wells by definition go into the hydrocarbon
9 containing formation, but they're not heater wells. Most, 99.99 percent of
10 wells are not heater wells.

11 He doesn't have a heater well. He has a well that goes all the way
12 down there and then he heats the top of his ordinary well. That's not a heater
13 well and it does not heat the hydrocarbon containing formation.

14 JUDGE HORNER: Is "heater well" a term of art?

15 MR. MEYERTONS: No, it's a term in this patent. It's been used in
16 many, many patent applications, especially by Shell, that we have written.
17 There is literally hundreds of these applications that talk about heater wells.

18 A heater well is a well that provides heat, and specifically in this
19 context, it's a heater well that providing heat to the hydrocarbon containing
20 formation.

21 JUDGE KERINS: Is there a definition that excludes producing wells
22 from that term?

23 MR. MEYERTONS: I don't think so, no. I don't think a producing
24 well would be excluded from that, but it has to have -- if the producing well
25 is heating the hydrocarbon formation, that would be a different story.

1 Eastlund is not doing that. Eastlund is a producing well, but it's
2 certainly not a heater well because it's not heating the formation. It heats the
3 earth, which doesn't contain the hydrocarbons at the top, where the hydrates
4 are going to form because of the cooling. It does not heat the hydrocarbon
5 formation.

6 Eastlund goes on to say--we have an AC supply configured to provide
7 AC at a frequency between about 100 to about 1,000 Hz. Eastlund in
8 Column 4, lines 19 to 28, talks about going from DC current. You can use
9 DC current or you can go one megahertz. That's a pretty broad range. You
10 can go from zero basically to a million.

11 We have a range in our claims of 100 to 1,000.

12 Then he talks about well, maybe you can use 50 to 60 or maybe you
13 can use 100,000.

14 The AC supply, I think he has an AC supply there. It's arguable
15 whether it's in the range of our claims.

16 Then we have one or more electrical conductors located in the heater
17 well. At least one of the electrical conductors extending from the surface
18 into the hydrocarbon containing layer. Clearly, Eastlund does not have that.
19 It does not have an electrical conductor that's going into the hydrocarbon
20 containing layer.

21 “[A]t least one of the electrical conductors being electrically coupled
22 to the AC supply.” Again, the AC supply in Eastlund does not connect to an
23 electrical conductor which goes into the formation, the hydrocarbon
24 containing layer.

25 JUDGE McCARTHY: I presume it's your position that Bell would
26 not teach an electrical conductor coupled to an AC supply?

1 MR. MEYERTONS: Bell's got a DC supply. The only figure in Bell
2 has a DC supply. The only time they mention AC in Bell is when they say
3 by the way, if you want to supply power to your DC, you can supply it from
4 an AC.

5 Bell has DC going into the formation. Bell is the least relevant of the
6 references. What they're doing in Bell is dual heating.

7 They take electrolytes, they inject it in the formation, put an anode
8 here, a cathode here, shoot DC current down here. It goes through the
9 electrolyte, through the formation. As it goes through the electrolyte, it puts
10 off heat, and it releases gas, in Bell.

11 Bell is not mobilizing. Bell is not using electric resistance heaters.
12 Bell is not using AC current.

13 With respect to Eastlund, the key limitation in the claim directed to
14 the Curie heating or the temperature limit heating is the limitation about the
15 conductors having electrically resistant ferromagnetic material, an electrical
16 conductor being configured to provide electrical resistant heat output during
17 application of AC to an electrical conductor, and the electrical conductor
18 being configured to provide a reduced amount of heat above or near a
19 selected temperature, the selected temperature being within about 50 degrees
20 C. of the Curie temperature of the ferromagnetic material.

21 So, it's not just providing any old reduced temperature. It's providing
22 a reduced temperature that's within that range of the Curie temperature of the
23 ferromagnetic material.

24 In other words, this is specifically designed to have this effect.
25 Nothing in Eastlund about that. In fact, there is nothing in any of the

1 references at all about that except for Rose. Rose talks about having Curie
2 heaters.

3 It goes on to say the system is configured to provide heat to the
4 hydrocarbon formation, such as heat transfers from at least one of the
5 electrical conductors to hydrocarbons in the hydrocarbon formation to at
6 least mobilize some hydrocarbons in the formation.

7 That limitation is important. It's not just configured to provide heat
8 anywhere. You're providing heat to the hydrocarbons in the hydrocarbon
9 formation so that you can mobilize them.

10 In Eastlund, all he's doing, as I said, is heating the tubing at the top. Is
11 he heating hydrocarbons that's in that tubing? Sure. The hydrocarbons are
12 coming up. The hydrocarbons are not in the formation, and they're not being
13 mobilized.

14 The only reason those hydrocarbons got there in the first place is
15 because they were mobilized by virtue of the fact they were coming up from
16 pressure under the ground through the tubing. So, they are already
17 mobilized.

18 One of the things about Eastlund that I've hit upon is the fact that he's
19 heating at the top. Eastlund also says he's heating at the top. In fact, he has
20 in one embodiment talking about having this cable, and he says, and I quote,
21 "It is preferred to form the lower section or sections of the cable such that
22 the resistance is lower." Lower resistance is going to give you less heating.

23 "This results in more heating being released in upper sections of the
24 well." That is Column 9, lines 63 through 66.

1 He's basically saying exactly what I'm saying, heat the stuff at the top,
2 because that's where it is going to cool. Don't heat the bottom. In fact, it's
3 preferred that you heat the top.

4 When you really look at Eastlund, the primary reference cited, not one
5 feature of the independent claim, with the exception of the AC supply, is
6 taught in Eastlund.

7 One of the things that the Examiner is saying is well, you know, you
8 can take Eastlund and you can combine it with these other references.

9 All right. Let's say you combine it with Rose. Rose teaches a Curie
10 heater. In fact, it has great details about Curie heaters. Rose doesn't teach
11 anything about heating a formation, wells, conductors, mobilizing, any of
12 the key features in this claim. None of those features are taught at all by
13 Rose.

14 The other references, Bell, which I think is clearly the least relevant of
15 the references, as I pointed out, has DC source. It doesn't have anything to
16 do with electrical resistance heating. It doesn't have anything to do with
17 Curie heating or temperature limiting heating. It doesn't have anything to do
18 with these features.

19 I might add that in Bell, he talks about making sure you heat to less
20 than 500 degrees. In one of our dependent claims, we talk about heating to
21 at least 650 C., which is 1,200 degrees. That's a big difference when you're
22 heating under the ground. You're talking about different metallurgy,
23 completely different technology.

24 The last reference is Van Egmond. Van Egmond, it has a heating
25 system in it, and it's cited for the purpose of showing heating from the

1 surface going down into the formation. That's true, but Van Egmond doesn't
2 have anything to do with a temperature limiting heater.

3 In fact, Van Egmond, I think, is kind of interesting because Van
4 Egmond is a 1991 reference. It's a Shell reference. As I said to you, the
5 Curie heater works by dramatically lowering the resistance when the
6 temperature of the material gets to a certain temperature. By lowering the
7 resistance, you get less heat.

8 Van Egmond says, and he teaches away from this concept when he
9 says, "A resistance which varies significantly with temperature would cause
10 the current required to vary excessively." This is Column 5, lines 27
11 through 29.

12 Van Egmond didn't have any recognition of this crushing problem.
13 Any recognition, there was no teaching about this crushing issue, but Van
14 Egmond says whatever you do, you don't want to make sure that your
15 resistance goes down dramatically or significantly with temperature, which
16 is exactly what our claims say, and what our claimed system does. It's
17 exactly opposite.

18 I would like to point out one thing, which we put it in the information
19 disclosure statement. In fact, we asked for reconsideration.

20 I was in an appeal about six months ago here, I think, in this room.
21 We had a similar claim. It's not exactly the same, but the rejection was a
22 different reference, Pritchett, instead of Eastlund. It was rejected in view of
23 Rose and Van Egmond and some other references.

24 It basically was a Curie heating system. Pritchett was a system that
25 was used to heat the top of a well, just like Eastlund. We got a decision on

1 that case in August of this year, and in that decision, they reversed the
2 Examiner and said that the claims were allowable over that cited art.

3 We submitted that in an IDS. I have a copy. If I can help you guys by
4 providing a number or copy, I'd be happy to.

5 JUDGE McCARTHY: We've already had an opportunity to review
6 that opinion.

7 MR. MEYERTONS: All right; good. What I thought was the most
8 pertinent thing about that opinion because it applies exactly in this case is
9 that the Board said the main reference did not teach hydrocarbon heating, no
10 matter how you read it, it doesn't teach hydrocarbon heating.

11 That's exactly what the case is with Eastlund. It is exactly the same in
12 this case.

13 JUDGE KERINS: Counsel, you mean hydrocarbon formation
14 heating?

15 MR. MEYERTONS: Excuse me, I'm sorry. Hydrocarbon formation
16 heating, yes.

17 The Board also said that Rose, even if it was inserted into the main
18 reference, wouldn't heat a hydrocarbon layer. That's exactly the case here.
19 If you took the Rose Curie heaters, you put them into the Eastlund system,
20 you'd be heating to about 85 degrees F., first of all. You wouldn't mobilize.
21 You wouldn't be in the hydrocarbon layer. You wouldn't be near the
22 hydrocarbon layer. You wouldn't heat the hydrocarbons in the formation,
23 even if you took Rose and put it in there.

24 Finally, I thought what was a good point is that even if you took all
25 those things, even if you could take Rose, which is outside the field of this
26 art, but if you took it and you put it in there, why would a person do this?

1 You have the Eastlund system. He's heating to 85 degrees. You have
2 this crushing problem which is unrecognized in any of the art. What would
3 the motivation, suggestion -- why would you take and heat with a curie
4 heater, which is more expensive and difficult to make, why would you put
5 something like that in the Eastlund system when Eastlund is already using an
6 electric resistance heater?

7 He doesn't have any problems with crushing. You go to 85 degrees
8 F., I promise you, he's not going to have a problem with crushing.

9 There is no reason to do it. There is no reason why anybody would be
10 motivated, suggest or taught to do it.

11 Anyway, that kind of sort of summarizes our positions on this. I'm
12 glad to hear you guys have seen that previous Board decision. I thought that
13 was an interesting decision.

14 JUDGE HORNER: Any further questions?

15 JUDGE KERINS: I actually do have one question, point of
16 clarification. You have the claim limitation that talks about the electrical
17 conductor being configured to provide a reduced amount of heat above or
18 near a selected temperature, and that temperature being within 50 degrees of
19 the Curie temperature.

20 MR. MEYERTONS: Yes.

21 JUDGE KERINS: That's a function of the material you selected, is
22 that not correct?

23 MR. MEYERTONS: It is.

24 JUDGE KERINS: Okay.

1 MR. MEYERTONS: It is going to be -- if you don't select the right
2 materials, some metals, it won't work. It just won't do it, because you won't
3 have the Curie effect.

4 In fact, you have to carefully select those materials. You have to
5 select which temperature you want. What you do -- in real life, what's really
6 done is you say okay, look, I want to crank as much heat as I can into this
7 formation. My metallurgy is my limiting factor though.

8 I get to about 1,300/1,350. Get hotter than that, everything starts
9 melting, breaking, twisting.

10 I'm going to drive for say 1,270 degrees. I want it to cool if it gets any
11 hotter than say 1,300 degrees, 1,350, 1,320 degrees. You design the
12 metallurgy in that electrically resistant section so that metallurgy has that
13 feature.

14 JUDGE KERINS: Thank you.

15 MR. MEYERTONS: All right. Thanks so much for your time.

16 JUDGE HORNER: Thank you.

17 (Whereupon, at 3:31 p.m., the proceedings were concluded.)